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The Effect of Providing Partial Presentation Notes on Student Success Factors

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THE EFFECTS OF PROVIDING PARTIAL PRESENTATION NOTES ON STUDENT SUCCESS FACTORS

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Psychologists and educators have examined the use of a wide variety of technological advancements in the classroom, and have studied the effects of these new tools on many factors that affect classroom performance. However, little research exists to demonstrate how specific teaching techniques, specifically the provision of partial or skeletal presentation notes (such as might accompany a Power Point presentation), affect factors that we already know to affect academic success, such as locus of control and academic self-efficacy. This study sought to discover the impact that providing partial presentation notes for use during lecture would have on students' performance, as well as changes that might result in their locus of control and academic self-efficacy beliefs. Additionally, this study sought to examine the impact of cognitive load and interest as exploratory variables. In order to determine the effects of partial presentation notes on performance, locus of control, and self-efficacy, this study examined the locus of control and self-efficacy of students assigned to either receive partial or complete presentation notes to accompany a visual presentation and lecture. It was expected that the participants in the partial notes condition would score better on the exam, experience more internal locus of control, and higher academic self-efficacy than those in the complete notes condition. The results showed that neither locus of control nor self-efficacy were positively affected by condition. Additionally, performance was not affected by condition. However, locus of control increased for those participants in the

complete notes condition, which was the opposite of the expected relationship. However, some interesting relationships emerged between the variables of interest and the exploratory variables. Higher self-efficacy was correlated with greater interest, and greater interest led to more positive change in self-efficacy. Higher self-efficacy meant better scores on the exam and lower cognitive load. Higher cognitive load was correlated to lower exam scores. These results suggest that many factors need to be considered before implementing new technology in the classroom.

Introduction

Due to rapidly developing technology and its effects on classroom policies and procedures, advice for instructors on incorporating technology is necessary and practical (Poling & LoSchiavo, 2014). In education, it is particularly important to stay current with new technology, as well as with the research evidence that either supports or discourages its use. The use of new technological advances, without a proper understanding of potential impacts, might lead to negative outcomes for both students and instructors. Thus, continued research into these developments is important to understand all of the potential implications of new technologies as used in the classroom. PowerPoint and other presentation software tools are relatively new advances for which we still lack a complete understanding of the ramifications.

Education has seen its fair share of technological improvements, and new developments have changed the ways teachers are able to disseminate information to students. Biddix, Chung, and Park (2016) found that instructors in the United States often use technology, including online content and electronic devices, to enable students to access material and ask questions. Other studies have demonstrated the expanding role of technology and technological devices in the classroom. For students in undergraduate classes at one university, the rates of electronic mail (e-mail) and online tasks required for class increased by 89% between 1999 and 2009 (Edgar, Johnson, & Cox, 2012). These results reflect not only the developments in disseminating and accessing information, but also the enhanced capabilities for communication between student and instructor.

Premature Implementation of Technology

The unfortunate reality is that, by the time researchers are able to fully explore the ramifications of these technological advances, they have often been commonplace in the classroom for years. Evidence of the downsides of some technological advances show the danger in adopting new technology before fully understanding the implications of doing so (Oinas Vainikainen, & Hotulainen, 2017). For example, one study examined how communication technology is used in Finnish schools to communicate feedback to students and their parents (Oinas et al., 2017). Although technology was used to provide both positive and negative feedback to parents in the form of lesson notes, the amount of feedback given was not distributed evenly. In fact, both negative feedback (regarding inappropriate behavior, forgotten homework, etc.) and positive feedback (teacher praise) were limited to only a small group of students. These results indicate that continuing research is required to establish better guidelines regarding the use of communication technology for the equal benefit of all students. Thus, even though technology allows the opportunity to provide more rapid feedback, it may not always lead to the best feedback.

Baker, Gustafson, and Shah (2014) indicated that rapid technological advances can present challenges to ways in which we conduct research. Although technological advances in the classroom are meant to help educators and students, the speed at which the technology develops creates unique difficulties in conducting new studies and implementing new policies. If ongoing studies are made irrelevant because of the speed at which technology advances, research cannot hope to reach consensus in time to be current with each new development. For example, Riley, Glasgow, Etheredge, and Abernethy (2013) noted that the typical path from initiation to publication in medical

research is approximately seven years. They further noted the incredible developments in technology that could take place in the same timespan, such as the introduction of the iPhone, the iPad, and Twitter. To that end, the present study seeks to answer the following question: what might we not fully understand about the use of presentation software in the classroom?

Presentation Software

Presentation software has become increasingly popular in the classroom, and is an example of a teaching tool that may not have been fully understood before widespread implementation. Although many college professors rely on presentation software, such as Keynote or PowerPoint, findings on the effectiveness of these tools are mixed. If presentation software can facilitate teaching for some professors, but hinder it for others (Hardin, 2007), certainly more research into the use of presentation software is warranted. Student opinions of presentation software use in the classroom are also a relevant factor to consider. For example, although many students in one study reported that the use of the presentation software, Prezi, captivated their attention better than typical lectures, some stated that they found it distracting (Duffy, Guerandel, Casey, Malone, & Kelly, 2015). Thus, a closer examination of the potential effects of presentation software in the classroom is necessary.

PowerPoint is one of the most frequently utilized presentation software tools in classrooms (Craig & Amernic, 2006), as it provides instructors with a visual aid for lectures. Despite the fact that PowerPoint was released for Macintosh in 1987 ("Microsoft PowerPoint | software," n.d.), research into the effects and implications of its use continue today. In fact, Garrett (2016) examined the different ways in which

academics use PowerPoint, and specifically how the disciplines differ in their use of text on each slide. Garrett found that for some disciplines (described as "hard" disciplines) such as Computer Science, more bullet points and simple phrases are used, while in "soft" disciplines, like History, more complex and longer sentences are used on each slide. Not only the type of text, but also the types of graphics utilized in the presentation differs between soft and hard disciplines. Additionally, PowerPoint was perceived by students as more effective when used in some disciplines, such as Management and Marketing, but not as effective when used in other disciplines, such as Information Technology and Finance. In a study that examined the use of PowerPoint in business courses, students rated the use of PowerPoint as less effective when used for quantitative business classes (such as accounting) than when used in more theory-based classes (like management; Burke, James, & Ahmadi, 2009). Burke et al. suggested that disciplines focusing primarily on theory, such as marketing and economics, are better suited to the use of PowerPoint, as opposed to accounting, which may be better suited to the use of a chalkboard to work out lengthy problems. If these kinds of specific details create meaningful differences for students, how might PowerPoint impact student performance?

In addition to choosing whether or not to use PowerPoint in class, instructors must also make decisions about how they use slides and what they include on each slide. Buchko, Buchko, and Meyer (2012) examined the effect of PowerPoint on recall of information presented in religious sermons, and found that slides with only visual images (i.e., no words) were less effective at enhancing recall than no slides at all. Results like these reflect the importance not only of continued research into the implications of PowerPoint as a teaching tool, but also of keeping instructors up to date with research and

applying the results to their use of technology in the classroom. This likely means an occasional modification of classroom procedures.

Provided Notes Accompanying Lecture

With the use of PowerPoint comes additional options for teachers and students, namely, the provision of copies of the presentation itself. PowerPoint allows users to print full-page slides, multiple slides on one page, slides with blank space beneath them, or slides with lines next to them for note-taking. Some instructors use these options to provide complete notes to students before the lecture begins. Long (2014) found that students who were provided with complete copies of the lecturer's notes participated more in class and had slightly better performance compared to their participation and performance when they took their own notes during the lecture. This may be due to a reduction in the demand for divided attention with the provision of notes and elimination (or reduction) of note-taking. Another study suggested that guided notes improve notetaking because of the reduction in cognitive demand and provision of a clear structure around important lecture points (Haydon, Mancil, Kroeger, McLeskey, & Lin, 2011). Thus, the research supporting the use of partial versus complete notes is not entirely clear, warranting further investigation.

Although some evidence suggests that providing complete copies of the instructor's notes facilitates better performance, results of other studies have been less favorable of complete notes provision (Annis, 1981; Cornelius & Owen-DeSchryver, 2008). Performance differences between students who received slight variations in the level of completion of notes provided have been observed (Annis, 1981). Some instructors, in lieu of providing the complete slides with which students may follow

along, have elected to provide altered versions of the slides projected on the screen. That is, the slides on the screen are complete, but the printed slides provided to students have key terms or phrases missing, and are often replaced with a blank to indicate that something is missing. As indicated by Cornelius and Owen-DeSchryver (2008), final course grades were better for students who were provided with partial notes than for those provided with full notes.

Even before the widespread use of Powerpoint, researchers studied the impact of variation in degree of completion of provided notes on student performance. Annis (1981) found that, even when using paper packets of notes while listening to a lecture, students preferred the provision of partial notes to the provision of complete notes. Annis also noted that, when asked their preference, students preferred to take their own notes over having full notes provided for them. Both the students who were provided with partial notes and those who took their own notes outperformed the students who were provided with full notes. Others have found that students performed best when they were able to review instructor provided notes in combination with their own personal notes (Kiewra, 1985). This study further suggested that partial notes (allowing for the addition of personal notes) leads to better performance than standard notetaking. This could be because the partial notes provide a focus on ideas and an established organization (Kiewra, 1985).

Although the studies conducted by Annis (1981) and Kiewra (1985) shed some light on the utility of partial notes provision, it should be noted that these studies were conducted before the use of PowerPoint. Thus, even if a visual aid were used, these results might differ from the results of studies that used a Powerpoint slideshow.

However, Cornelius and Owen-DeSchryver (2008) reported similar findings when Powerpoint was used: four different sections of the same college course, counter balanced across two instructors and two different times of day, were assigned to download either full PowerPoint notes or partial PowerPoint notes and bring them to class. Although the effects were not immediate, on the last two tests (including a cumulative final exam), students who were assigned to use the partial notes outperformed those students who were assigned to use the full notes, and thus had better final grades. This might be because students who took partial notes interacted with the material in more ways than those who received complete notes (i.e., they listened to the lecture, viewed the slides, and wrote down some information as opposed to only listening and viewing). These results provide some evidence of the effect of providing partial notes on performance, but what about the effects on other factors known to impact learning?

Although some existing research demonstrates that the provision of partial notes is beneficial for academic performance, little research exists to show the effects of PowerPoint notes on factors that affect performance. PowerPoint seems to be a prime example of a technological development that emerged as a staple product before it was fully vetted. How does the use of PowerPoint, and specifically the provision of partial PowerPoint notes, affect other factors that relate to academic success?

Factors affecting academic success

Environment, intelligence, and non-cognitive factors, like personality, interact to influence academic achievement (Mourgues, Hein, Tan, Diffley, & Grigorenko, 2016). In studies of non-cognitive factors affecting academic achievement, several have emerged as having predictive ability. In one study, academic self-efficacy (beliefs held about

ability to succeed on academic tasks) and academic locus of control (beliefs about who/what is responsible for academic outcomes) were two non-cognitive factors that stood out as important additions to cognitive abilities when predicting grade point average (GPA; Grigorenko et al., 2009). Robbins et al. (2004) also found that academic self-efficacy is an integral factor in predicting GPA.

As previously mentioned, research has examined the direct effects of the provision of partial notes on performance. However, evidence is lacking on the effects of partial notes on other factors related to student success, and thus indirectly affecting performance. If the provision of partial notes affects student locus of control or self-efficacy, then performance may also be affected.

Lacking a clear understanding of the myriad of potential impacts on all factors affecting academic success has direct implications for both students and teachers. If teachers are unknowingly negatively impacting students' locus of control or self-efficacy, they might find themselves working harder than necessary in order to compensate for students' lower self-efficacy or external locus of control. For example, negative changes in these factors could potentially create problems for students (and their future teachers) for semesters to come. In gaining a better understanding of the effects of the provision of partial lecture notes, both instructors and students would be better equipped to succeed in the classroom.

Research into the specific teaching technique of using Powerpoint slides to supplement lectures, and both the direct and indirect effects of this technique on factors affecting student success, will not only provide an opportunity to assist students and teachers in effectively utilizing available technology, but will also deepen our

understanding of the implications of new technological developments. Without a serious commitment to this understanding, we can never responsibly use the technology to our benefit. Students deserve the best chances at success that we can provide, and technology continues to develop to enable us to provide more of these opportunities. However, if we do not fully understand the implications of employing these techniques and devices, and of blending various techniques or creating our own, we do a disservice to students.

Fortunately, we know that research can help to elucidate some of the issues with the burgeoning technology and its use in the classroom. Previous research has shown us that texting in class has a negative effect on final class grade (McDonald, 2013), that taking notes on a computer leads to worse performance on conceptual questions (Mueller & Oppenheimer, 2014), and that students with high test anxiety experience lower test anxiety when they take exams online (Stowell & Bennett, 2010). These studies, and others like them, have aided instructors and students in changing and updating policies, procedures, and behaviors to better equip students for success. It is imperative, then, that we continue to conduct further research into other aspects of education, such as the use of specific techniques, and the resultant direct and indirect effects on student success. How might teaching techniques, such as the use of presentation software, affect academic success, both directly and/or indirectly? Specifically, how are factors related to academic success, such as self-efficacy and locus of control, affected by specific teaching techniques?

Self-Efficacy

Self-efficacy is perhaps one of the most important factors affecting academic success. Bandura (1977) defined self-efficacy as the beliefs people hold about their

abilities to succeed, and in academic settings, these beliefs play an enormous role in attaining success. In fact, one study found that self-efficacy was the best predictor of performance when compared with other factors, such as goal orientation and metacognition (Coutinho & Neuman, 2008). Although the impact of self-efficacy on academic achievement is clear, there are some caveats. For example, the positive effects of self-efficacy on goal progress only exist when the individual finds the goal to be important. When a goal is viewed as unimportant, high self-efficacy does not impact goal progress (Beattie, Hardy, & Woodman, 2015). These results are of particular interest for college students, who are frequently required to enroll in courses outside of their field of interest.

In addition to the numerous studies conducted on the effects of self-efficacy on individual-level factors, the effects of classroom policies and behaviors on self-efficacy have also been examined. As noted by Lee (2015), self-efficacy is an academic factor that is subject to change over the course of a semester. Not only is self-efficacy a variable factor, it is also affected by teacher intervention (Lee, 2015). Lee (2015) found that instructors can influence student self-efficacy by implementing strategies in the course to foster self-efficacy beliefs. Additionally, Myyry and Joutsenvirta (2015) found that self-efficacy was negatively affected when students were unfamiliar with the examination option (such as taking tests online), and that some students reported an increase in anxiety compared to the in-class examination option. These results reflect the importance of instructors fully understanding the implications of using specific techniques in the classroom, because specific techniques might have direct effects on variables affecting performance, such as self-efficacy. Schunk (1991) reiterated the results of his 1983 study,

which showed that providing students with a goal improved their self-efficacy about a specific task. Additionally, he stated that students who were allowed to set their own goals ended up with the highest degree of self-efficacy, over both those students whose goals were assigned and those with no goals. Schunk (1989) also reported on the importance of performance feedback, instruction on appropriate strategies, and models for social comparisons in affecting student self-efficacy. The results of these studies indicate that specific teaching techniques, classroom policies, and teacher interventions can affect student self-efficacy over time.

Not only are self-efficacy beliefs affected by teaching techniques, but also they seem to be affected by the perception of self-regulated learning. One study found that self-efficacy beliefs and academic achievement were positively correlated, which led the authors to conclude that it is important for students to see that they themselves play a part in regulating learning activities in order to feel confident about mastering material (Zimmerman, Bandura, & Martinez-Pons, 1992). Mastery experiences play a large role in the construction of self-efficacy beliefs, along with vicarious learning, socially persuasive communication, and affective arousal the individual experiences during task engagement (Bandura, 1986). In fact, one study showed that, out of the four sources proposed by Bandura, performance accomplishments (like mastery experiences) had the strongest association with self-efficacy (Byars-Winston, Diestelmann, Savoy, & Hoyt, 2017). Could the provision of partial notes also provide more opportunities to develop mastery experiences, thus improving academic self-efficacy beliefs?

Myyry and Joutsenvirta (2015) investigated aspects of self-regulated learning by examining the classroom experience of many university students. They studied the

student differences that arose between students taking traditional in-class exams and online exams with access to the textbook and the internet, such as the methods of preparation, rates of responding, and learning. When students were able to take exams online, at a time of their choosing, and with access to the book and the internet, they were more likely to view the test-taking experience as self-regulated. Additionally, those students were more likely to report understanding at a deeper level, and also reported having put a bigger emphasis on actually learning the material instead of utilizing rote memorization (Myyry & Joutsenvirta, 2015). These results reflect the importance of the beliefs that students hold about their own abilities to succeed, and the effect that these beliefs have on academic performance. Additionally, these results indicate that classroom policies, procedures, and teaching techniques can affect students' perceptions of self-regulated learning. If students see the provision of partial PowerPoint notes as helpful in goal setting (e.g., acquiring all of the necessary information from each lecture), or as instruction on an appropriate note-taking strategy through the acquisition of the main points of the lecture, then the provision of partial PowerPoint notes is likely to positively affect academic self-efficacy. Student performance and self-efficacy may also benefit from the provision of partial notes, as students would be able to add their own notes to the important points given by the instructor when using this format, facilitating both surface and deep level processing (Feldon et al., 2018). In fact, one study showed that students took better notes when they were provided with guided notes than when they only viewed a lecture without provided slides (Austin, Lee, & Carr, 2004).

Locus of Control

Locus of control and self-efficacy are often studied together because both constructs are related to power over the learning situation: self-efficacy is the belief that a person holds about his/her ability to complete a task, and locus of control is the belief a person holds about outcome attribution (Rotter, 1966). Self-efficacy and locus of control have also been linked to other variables that affect student success, such as goal orientation. Self-efficacy is positively correlated with a mastery orientation (the goal is to learn new material or skills; Ford, Smith, Weissbein, Gully, & Salas, 1998), which is also positively correlated with locus of control (Buluş, 2011). Therefore, self-efficacy and locus of control both play an important role in academic success, and students would likely benefit from policies or techniques that lead to positive changes in these variables.

The importance of a student's academic locus of control cannot be overstated. One study found that locus of control was the most important factor when trying to predict the chances of a student applying to graduate school (Nordstrom & Segrist, 2009). Additionally, external locus of control and general self-esteem have been shown to be negatively correlated, such that students with external loci of control may also experience lower self-esteem (Smith, Sapp, Farrell, & Johnson, 1998). These results highlight the importance of understanding the effects of teaching techniques on locus of control: if a specific technique can positively affect a student's locus of control, the student's self-esteem and academic performance might increase as well. If students view the provision of partial PowerPoint notes as providing them with a bigger role in regulating their learning, they might experience more internal locus of control and/or higher academic self-efficacy.

The significance of an internal locus of control, or the belief that outcome is dependent upon factors unique to the individual, was explained in a study examining performance declines (Allen, Giat, & Cherney, 1974). Internal locus of control led to consistent levels of performance for students in courses dependent on student control. Students who held external loci of control were more likely to experience performance declines. Students with an external locus of control seem to benefit only when discipline conditions of the classroom are high, such as when there is greater pressure to perform or the instructor is stricter. Internal locus of control, on the other hand, seems to benefit performance more when the discipline conditions of the classroom are low (Parent, Forward, Canter, & Mohling, 1975).

Classroom policies and structure appear to play a large part in the development of factors linked to academic success. However, less is known about how specific techniques and tools directly affect students' locus of control. One study found that, when given expectations about their performance before an exam, students with an internal locus of control were more affected by the expectation and performed more congruently with whichever expectation they had been given (i.e., good performance or poor performance), than students with external loci of control (Feldman, Saletsky, Sullivan, & Theiss, 1983). In classrooms then, the performance expectations offered by instructors may have an impact on student performance.

Instructors themselves also directly affect student locus of control. Perry and Dickens (1984) found that high instructor expressiveness (i.e., more physical movement, greater inflection, more eye contact, and humor) positively affected achievement and internal locus of control among some students. These results suggest that locus of control,

like self-efficacy, can be altered through the behaviors of instructors and the policies and techniques employed in the classroom. If the use of technology in the classroom affects the student's perception of instructor expressiveness, it is likely that locus of control will be similarly affected. Therefore, it is worthwhile to examine the possibility of a link between technology use in the classroom and student locus of control.

Although numerous studies have demonstrated that specific teaching techniques affect self-efficacy (Lee, 2015; Schunk, 1991) and locus of control (Feldman et al., 1983; Perry & Dickens, 1984), little evidence exists of a specific effect of partial note provision on these variables, and thus indirectly on performance. If the provision of partial PowerPoint notes affects self-efficacy and/or locus of control, it is also likely to affect performance.

Exploratory Variables

Self-efficacy and locus of control undoubtedly play a large role in academic success. However, they also appear to be related to other factors, such as cognitive load and interest, which are involved in academic performance. Cognitive load is best understood as the demand on working memory (Read, Lynch, & Matthews, 2018), the capacity of which is limited (Sweller, van Merrienboer, & Paas, 1998). This is an important point for instructors to remember when designing their courses (Bolkan, 2016), as too much cognitive load can be detrimental to performance. It is possible that the provision of partial notes would reduce the cognitive load of trying to write down every word spoken by the professor, in addition to every word written on the slides. If cognitive load is reduced with the provision of partial notes, it is also then possible that note-taking would be a more efficient process. Because cognitive load is related to academic

performance and self-efficacy (Feldon, Franco, Chao, Peugh, & Maahs-Fladung, 2018), and locus of control (Sunawan & Xiong, 2017), it will be included in this study as an exploratory variable. Interest is a student factor that also carries weight in academic performance, as students who are interested during class are likely more involved (Mitchell, 1993). Additionally, interest appears to be related to both academic self-efficacy and locus of control (Tella, Tella, & Adeniyi, 2009). Thus, interest was included in this study as an exploratory variable.

The Present Study

Little research exists on the use and effects of specific teaching techniques on self-efficacy or locus of control. In particular, a gap exists in the literature regarding the provision of partial PowerPoint notes and the effects on these variables. The use of PowerPoint in college courses, and even the provision of partial notes to accompany the lecture in class, is typical of many university classes. However, we do not yet fully understand the implications of this specific technique. With a clear view of the existing literature, it is conceivable that a teaching tool like PowerPoint and accompanying handouts could have an effect on the above-mentioned variables, and thus indirectly on performance. Although some evidence of the impact of providing partial notes on performance exists, it is important to note the indirect effects as well because of the potential long-term implications of locus of control and self-efficacy on future performance. The present study attempted to discover the impact that providing partial notes from a PowerPoint presentation for use during lecture has on student self-efficacy and locus of control. In order to determine the effects of the provision of partial notes, I examined the self-efficacy and locus of control of students as they completed tasks in

different conditions. The provision of partial notes was expected to lead to a more internal locus of control and higher academic self-efficacy than providing complete notes.

The hypotheses for the proposed study are described below:

Hypothesis 1: The provision of partial PowerPoint notes will lead to greater increase in locus of control than the provision of complete notes.

Hypothesis 2: The provision of partial PowerPoint notes will lead to greater increase in academic self-efficacy than the provision of complete notes.

Hypothesis 3: The provision of partial PowerPoint notes will lead to better test performance than the provision of complete notes.

In addition, the impact of partial notes on the following variables will be examined: cognitive load and interest.

Method

Participants

178 participants completed Part One of the study online. Of those 178 participants, 80 returned for Parts Two and Three, resulting in 80 complete data sets (a completion rate of 44.9%). Participants were undergraduate students, ages 18 and up. Participants were recruited through the Department of Psychology's online research recruitment and scheduling system, StudyBoard. This system allows undergraduate students to sign up for ongoing research studies posted by graduate students and faculty. All participants received course credit for participating. The majority of participants in this sample were students in introductory psychology courses. Therefore, the sample included students from a variety of majors.

Materials

A presentation tool (PowerPoint™) was utilized to present information visually, accompanied by a spoken lecture. All lectures were given by the same researcher. The lecture material covered the Sanitary Movement, a period in European and American history during which policies and infrastructures were established to prevent the spread of disease. A 20-minute portion of a transcript from a Yale University open course, freely available online, was used for the verbal portion of the lecture (see Appendix E). The course from which the lecture was taken, History 234: Epidemics in Western Society Since 1600, was recorded live in Spring 2010 (Snowden, 2010). Similar to the format of a university course, the lecture was given aloud for participants while they view the accompanying slideshow. The slideshow was created by the researcher based on the material in the lecture. An informal feasibility study of these materials with

undergraduates at the same institution indicated that the lecture material was easy enough for all participants to understand, but specific enough that participants were unlikely to have had any direct instruction or exposure to the information in the past. Prior to the full study, a pilot study of the lecture, exam, and questionnaires was conducted with a separate group of students who did not participate in the present study. Results of the pilot study indicated that although the material was appropriate, the lecture would better approximate a college course if it were delivered extemporaneously instead of read from a script. In addition, one of the exam questions was eliminated as it was deemed too difficult after pilot testing. The edited exam was challenging enough that a naïve participant would not be able to pass without having attended the lecture (See Appendix I).

For the complete notes group, participants were provided with a full printout of the PowerPoint lecture slides, with three slides per page and extra space allocated for additional notes as necessary (Chen, Teo, & Zhou, 2017; see Appendix F). Participants were informed that they could take additional notes if they wished, as they deemed appropriate. For the partial notes group, participants were provided with the same printed slides, except key terms and phrases were replaced with blanks (see Appendix G).

The spoken lecture that accompanied the visual presentation followed the transcript provided by Yale University, and expanded on the information presented visually (e.g., a slide that highlighted goals was on the screen while participants heard more details about each goal, with approximately 30 seconds of lecture per slide). This method, in addition to approximating actual college classroom procedures, allowed students to take additional notes. Additionally, it prevented students from simply

memorizing the slides to prepare for the exam. The exam following the lecture contained 14 questions (ten verbatim and four inference) based on information presented in the lecture. To further examine the effect of condition on performance, the exam included seven questions directly from the blanks in the slides (i.e., information that participants in the partial notes condition would have written in themselves, but that were visible on the screen) and seven questions from information that was either printed on all notes packets (regardless of condition) or presented verbally by the researcher (in both conditions).

Academic Self-Efficacy. In order to measure academic self-efficacy, I utilized the student scale of the Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000; see Appendix A). This scale includes five Likert-style questions designed to assess academic efficacy (e.g., "I'm certain I can master the skills taught in class this year," and "I can do almost all the work in class if I don't give up"). Scores range from 1 (not at all true) to 5 (very true), where high scores are indicative of greater academic self-efficacy. Reliability is acceptable for this measure (α = .78; Midgley et al., 2000). Self-efficacy scores as measured by the PALS are positively correlated with mastery goal orientations (as also measured by the PALS) across school subjects (Bong, 2001). To make the PALS measure of academic self-efficacy more appropriate for this study, directions were added to the beginning of the questionnaire that encouraged students to reflect on themselves as students in the study when answering the questions on this measure. No existing scale items were altered; only a new set of directions was added.

As perceived self-efficacy is best measured using scales that are specifically designed to suit the task (Bandura, 2006), I created a new measure of self-efficacy, New Self-Efficacy (NSE; see Appendix C) to measure participant self-efficacy with reference

to this study. This scale includes nine Likert-style questions designed to assess self-efficacy for this study (e.g., I'm certain I can master the material covered in this study," and "I can answer even the hardest questions in this study if I try"). Scores range from 1 (not at all true) to 5 (very true), where high scores are indicative of greater self-efficacy. Because the NSE was created for the present study, validity was assessed by comparing it with a validated measure used concurrently, in this case the PALS. The NSE was positively and significantly correlated with PALS measurements at all three time points, $r = .76 - .88$, $p < .01$. Additionally, the change in scores on the NSE was positively and significantly correlated with the change in PALS scores at two intervals, $r = .40 - .78$, $p < .01$.

Academic Locus of Control. Locus of control was assessed using Fishman's control scales (Fishman, 2014; see Appendix B). Fishman's control scales are based on Perry (1991) and Perry, Hladkyj, and Pekrun's (1998) development of a measure of perceived control for use in academic settings. Perry (1981) and Perry et al (1998) called the construct academic control, which includes both primary and secondary control. Fishman utilized both the primary and secondary control scales, both of which will be used in this study. The inclusion of both primary and secondary control scales allows researchers to assess both student perception of control (primary control) and perception of "capability to bring themselves in line with environmental forces" (secondary control; Fishman, 2014, p. 687). The primary control scale, as initially developed by Perry, Hladkyj, Pekrun, and Pelletier (2001), is a Likert-type scale that includes questions aimed at assessing student perceptions of control. There are questions such as "I have a great deal of control over my academic performance in my courses," and "The more effort I

put into my courses, the better I do in them." Scores range from 1 (strongly disagree) to 5 (strongly agree). Fishman reported acceptable reliability for this measure (α = .71). Perry et al., (2001) also reported a positive correlation between academic control and final grade, which is generally accepted as an "objective measure of academic performance" (p.782). Hladkyj, Pelletier, Drewniak, and Perry (1998) originally developed the Secondary Academic Control Scale, which includes four items rated on a Likert-type scale. There are questions such as "Whenever I have a bad experience at college, I try to see how I can 'turn it around' and benefit from it." The scores on this measure also range from 1 (strongly disagree) to 5 (strongly agree). Fishman (2014) reported reliability for the secondary control scales to be acceptable (α = .72).

Interest. Interest was measured using Mazer's Student Interest Scale (Mazer, 2012). This measure includes items that assess both emotional interest and cognitive interest. Emotional interest is best understood as emotional engagement with the material (Mazer, 2012), and cognitive interest can be observed when students have clear understanding of the material (Mazer, 2012). There are questions such as "I feel enthused about being in class," and "I can remember the course material." For the purposes of this study, the word "class" or "course" in each item was changed to "study" to make each statement more relevant to participation in this study. Scores range from 1 (strongly disagree) to 7 (strongly agree). Mazer (2013) reported acceptable reliability for both emotional interest items, (α = .95), and cognitive interest items, (α = .88).

Cognitive Load. Cognitive load was measured using one Likert-style question aimed at assessing participant's views on the mental effort required to complete the study task (see Appendix J). As noted by Ayres (2006), these kinds of subjective measures are

reliable and valid measures of cognitive effort, as higher scores are correlated with high error rates, which indicate task difficulty. For the purposes of this study, the cognitive load question asked, "The activity I just completed was," with answer choices ranging from 1 (Not difficult) to 7 (Very difficult).

Procedure

Participants provided informed consent prior to participation, and were informed about confidentiality and study procedures. They were told that they could elect to discontinue at any time. After they completed the study, participants were debriefed about their experience and told that they received course credit for their participation.

During Session 1 (the online session) participants provided informed consent and completed all of the above-mentioned measures (PALS, NSE, LOC scales) online. They also completed a demographics questionnaire at this time (See Appendix D). Participants attended Session 2 in person, where the lecture was presented visually with the PowerPoint presentation and verbally by the researcher. The researcher was familiar with the material and had previously presented the lecture to a group of students for practice. Participants were randomly assigned to receive either the complete printed presentation notes (complete notes condition) or the partial presentation notes (partial notes condition). The randomly assigned groups were as follows:

1. Complete notes group: Participants in this group were provided complete copies of the presentation (e.g., the handouts provided to the participants in this group were exactly the same as the slides in the presentation). They were informed that they could take notes on the paper provided, and that they would able to utilize the notes they took during the study period.

2. Partial notes group: Participants in this group were provided with partial copies of the presentation (e.g., the handouts provided to the participants in this group mirrored each of the slides seen in the presentation, but had key words and phrases replaced with blanks to be filled in by the student him/herself). They were informed that they could take additional notes on the paper provided (in addition to filling in the blanks) and that they would be able to utilize the notes they take during the study period.

There were 39 participants in the complete notes group, and 41 participants in the partial notes group. All students viewed the lecture in a lecture hall. Both groups viewed the lecture at the same time, but were seated on opposite sides of the lecture hall with several seats separating the groups to prevent distraction (e.g., so that a student who received complete notes was not seated next to a student who received partial notes). Students were pre-assigned to a condition using a coin toss, and were instructed to take their assigned seat when they arrived in the lecture hall. Seats were assigned using the existing letter/number system assigned to the seats (e.g., row A seat 2), and there was one empty seat between participants in the same group. Participants were asked to remove all personal materials from their desks and were then informed that a study period and exam would follow the lecture in one week. They were further informed that if they earned at least a 65% on the exam, they would be awarded two extra StudyBoard credits. In reality, all participants were awarded two extra StudyBoard credits regardless of exam performance (for a total of 7 credits across the three parts of this study). The deception was necessary to motivate participants to exert effort similar to that which they might exert during a course lecture and exam.

After the lecture, the participants were asked to hand in their notes and completed the second set of measures (PALS, NSE, and LOC). Participants also completed the Interest measure at this time (see Appendix H). After completion of the measures, participants were reminded to attend Session 3 one week later (see Appendix L). In order to mimic the conditions of a college classroom, and to ensure that all participants had the same amount of time between lecture and exam, Session 3 took place exactly one week after Session 2. During Session 3, participants first completed the PALS, NSE, LOC, and Interest measures again. They were asked to return these measures to the researcher, and were informed that the exam would begin in five minutes. Participants were then provided with their notes, and informed that they could use the time to study their notes if they wished to prepare for the exam. At the end of the study period, the participants' notes were collected and the exams were distributed. The exam consisted of 14 questions, both verbatim and inference, based on the lecture from Session 2. The last page of the exam contained three additional questions: one assessed cognitive load, another examined degree of participant motivation as a result of StudyBoard credit awards, and a third inquired about participant familiarity with the material (see Appendix K). The motivation item used a seven-point Likert scale to determine how strongly participants agreed with a statement that they were motivated to try harder on the exam because of the potential to earn extra credit. Following the exam, the participants were informed that they would be awarded StudyBoard credit for their participation. They were given information about how to contact the research team for any questions or concerns and then were excused. Following the completion of data collection for this study, all participants were contacted and debriefed. They were informed that they were awarded

three StudyBoard credits for their participation in taking the test, regardless of their scores on the test.

Two research assistants graded each exam. Whenever there was a discrepancy, a third rater scored the item in dispute. Inter-rater reliability was $\kappa = .49$, $p < .001$, indicating moderate, but acceptable reliability. To analyze the impact of providing partial notes on change in students' locus of control and academic self-efficacy, I utilized a multivariate analysis of variance (MANOVA). To analyze the impact of partial notes on performance, I utilized independent sample *t*-tests. Specifically, I examined the impact of experimental condition on change in locus of control (Hypothesis 1), change in self-efficacy (Hypothesis 2), and performance (Hypothesis 3) to determine whether the provision of partial notes led to a greater change in locus of control and self-efficacy and/or better performance.

Results

Descriptive Statistics

Of the 80 participants, 56.3% were freshmen, 27.5% were sophomores, 7.5% were juniors, 7.5% were seniors, and 1.3% identified as "other." A total of 72.5% identified as female and 27.5% identified as male.

Reliability and Validity of the NSE

The NSE, a measure of self-efficacy created for the present study, was positively and significantly correlated with PALS measurements at all three time points, $r = .76 - .88$, $p < .01$. Reliability for the NSE was excellent (Gliem & Gliem, 2003), Cronbach's $\alpha = .95$. Additionally, changes in scores on the NSE were correlated with the changes in PALS scores at two time intervals, $r = .40 - .78$, $p < .01$, indicating good convergent validity.

Relationship between Condition and Locus of Control

An alpha level of 0.05 was used for all analyses. To test the hypothesis that participants in the partial notes group experienced greater positive change in locus of control than participants in the complete notes group, MANOVAs were used. The interaction of condition and time was significant, $F(1, 78) = 5.12$, $p = .03$. From Time One (when participants viewed the lecture) to Time Two (when participants took the exam), change in locus of control varied significantly as a function of condition. In order to further investigate the interaction of time and condition, paired sample t-tests were used to investigate the change in locus of control as a function of condition. The change from Time One (lecture) to Time Two (exam) for Complete notes condition was not significant, $t(38) = -1.33$, $p = .19$, ($M = 50.95$, $SD = 4.34$ to $M = 51.51$, $SD = 4.43$) .

Additionally, the change from Time One to Time Two for Partial notes condition was not significant, $t(40) = 1.86$, $p = .07$, ($M = 51.51$, $SD = 5.64$ to $M = 50.68$, $SD = 6.41$). Although the change in locus of control between conditions differed significantly, this is likely due to the fact that the direction of the change is different for each condition; the difference in locus of control from Time One to Time Two within each condition was not significant. Thus, Hypothesis 1 was not supported.

Relationship between Condition and Self-Efficacy

To test the hypothesis that participants in the partial notes group experienced greater positive change in academic self-efficacy than participants in the complete notes group, MANOVAs were used. There were no significant changes in self-efficacy as a function of notes condition as measured by the PALS, F (1, 78) = .001, $p = .98$ or the NSE, F (1, 78) = .18, $p = .68$. These results indicate that Hypothesis 2 was not supported; self-efficacy did not differ as a function of whether partial or complete notes were provided. However, self-efficacy decreased significantly from Time 1 to Time 2, independent of condition, as measured by both the PALS, F (1, 78) = 6.30, $p = .01$ ($M = 20.56$, $SD = 3.26$ to $M = 19.75$, $SD = 3.56$), and the NSE, F (1, 78) = 13.63, $p < .001$ ($M = 36.39$, $SD = 6.05$ to $M = 34.0$, $SD = 7.28$).

Relationship between Condition and Test Performance

The average exam score across all participants was 47.8%, $M = 6.69$, $SD = 2.45$. Specifically, 2.5% of participants scored at or above 85%, 12.6% of participants scored 70-85%, 22.5% of participants scored 55-70%, 31.3% of participants scored 40-55%, 20.1% of participants scored 25-40%, and 11.3% of participants scored below 25%. These results are consistent with the pilot test scores, where the average exam score was

46.2%. These results may indicate that changing the lecture to be delivered more extemporaneously did not have as great an effect on performance as expected. Instead, the exam may have been too difficult. To test the hypothesis that participants in the partial notes group would outperform the participants in the complete notes group on the final test, independent samples *t*-tests were used. There was no significant difference in exam scores between participants in the partial notes condition (M = 6.83, SD = 2.05) and participants in the complete notes condition (M = 6.54, SD = 2.83), $t(78) = -0.53$, $p = 0.60$. These results indicate that Hypothesis 3 was not supported.

Responses to the motivation item indicated a neutral response or slight agreement with the statement that participants were more motivated by the potential for extra credits, M = 4.75, SD = 1.64. Although 32.5% of participants rated this item a six or seven on the Likert scale, this means that less than one-third of the participants were highly motivated by the possibility of extra credits.

Relationship between Condition and Interest

To examine the relationship between condition and the exploratory variable of interest, MANOVAs were used. There were no significant changes in interest as a function of condition, $F(1, 78) = .01$, $p = .92$. However, there was a significant change in interest from Time 1 to Time 2, $F(1,78) = 6.93$, $p = .01$, (M = 70.63, SD = 14.35 to M = 67.74, SD = 16.14).

Other Exploratory Variables

To examine the relationship between condition and the remaining exploratory variables, independent samples *t*-tests were used. As demonstrated in Table 1, there were no significant differences by condition in the number of test questions left blank, the

number of exam questions answered correctly coming from information in the blanks on the partial notes, number of correct exam answers for questions *not* coming from information in the blanks (i.e., information presented on all slides or given verbally), number of correct exam answers for inference questions, number of correct exam answers for verbatim questions, cognitive load, or motivation.

Table 1
Other Relationships by Condition (*N = 80)*

Variable	*M*	*SD*	*t*	*p*
Questions Left Blank			0.87	0.39
Partial Notes	0.95	1.60		
Complete Notes	1.36	2.51		
Correct from Blanks			-1.73	0.09
Partial Notes	3.32	1.33		
Complete Notes	2.67	1.98		
Correct Not From Blanks			0.8	0.43
Partial Notes	3.49	1.33		
Complete Notes	3.72	1.23		
Correct Inference			1.49	0.14
Partial Notes	2.73	0.93		
Complete Notes	3.03	0.84		
Correct Verbatim			-1.50	0.14
Partial Notes	4.07	1.85		
Complete Notes	3.36	2.40		
Cognitive Load			-1.48	0.14
Partial Notes	4.90	1.26		
Complete Notes	4.41	1.67		
Motivation			0.26	0.80
Partial Notes	4.70	1.60		
Complete Notes	4.79	1.69		

Other Noteworthy Relationships

Total scores on the new self-efficacy measure (NSE) were positively correlated with scores on the PALS at Baseline, $r = .88$, $p < .01$; Time One, $r = .82$, $p < .01$; and Time Two, $r = .76$, $p < .01$. Changes in self-efficacy (as measured by both the NSE and

the PALS) across three intervals were positively correlated, $r = .40 - .78$, $p < .01$. These results indicate that the self-efficacy measure created for this study reliably measured constructs similar to those assessed by the PALS measure of self-efficacy.

As indicated in Table 2, scores on both the PALS and the NSE were correlated with scores on the Interest measure at both times measured. These results indicate that higher self-efficacy was associated with greater interest in the study material during the lecture and the exam. Scores on the PALS also correlated with exam score. These results suggest that participants with higher self-efficacy beliefs at the time of the lecture and exam scored better on the exam.

Table 2. Correlations between Self-Efficacy Measures, Interest, and Exam Score

	Interest (Time One)	Interest (Time Two)	Exam Score
PALS (Baseline)	.23*	.34**	
PALS (Time One)	.53**	.50**	.22*
PALS (Time Two)	.57**	.62**	.23*
NSE (Baseline)	.22*	.34**	
NSE (Time One)	.51*	.50**	
NSE (Time Two)	.58**	.59**	

*p < .05, **p < .001

Although self-efficacy did not change as a function of whether full or partial notes were provided, the relationship between self-efficacy and locus of control, as well as the relationship between self-efficacy and interest, indicate that these variables are linked.

Cognitive load was negatively correlated with PALS scores (self-efficacy) at Time One (lecture), $r = -.31$, $p = .01$, and Time Two (exam), $r = -.33$, $p < .01$, indicating that students with higher self-efficacy beliefs at either the time of the lecture or exam experienced lower cognitive load when taking the exam. Similarly, cognitive load scores were negatively correlated with self-efficacy at Time One, $r = -.29$, $p = .01$, and at Time Two, $r = -.30$, $p = .01$, reflecting the same outcome—participants with higher self-

efficacy beliefs during the lecture and exam experienced lower cognitive load when taking the exam. Cognitive load scores were also negatively correlated with Interest scores at Time One, $r = -.25$, $p = .02$, and at Time Two, $r = 0.32$, $p < .01$. Thus, participants who felt greater interest during the lecture and the exam experienced lower cognitive load during the exam. Finally, cognitive load was negatively correlated with final exam score, $r = -.30$, $p = .01$, indicating that, consistent with previous research, participants who experienced lower cognitive load scored higher on the exam.

Discussion

The hypothesis that the provision of partial presentation notes would lead to greater increase in locus of control than the provision of complete notes was not supported. Although there was a significant change in locus of control between the two conditions, this is likely because the direction of the change was different in each condition, as the difference in locus of control from Time One to Time Two within each condition was not significant. Thus, the provision of partial or complete notes did not appear to have an effect on locus of control. The average locus of control scores decreased for participants in the partial notes condition, but increased for participants in the complete notes condition. Although neither of these changes were significant, the fact that the changes occurred in opposite directions best explains the significant interaction discovered. Additionally, the hypothesis that the provision of partial presentation notes would lead to greater increase in academic self-efficacy than the provision of complete notes was not supported. The hypothesis that the provision of partial presentation notes would lead to better test performance than the provision of complete notes was also not supported. This result is not consistent with previous research (Annis, 1981; Kiewra, 1985; Cornelius & Owen-DeSchryver, 2008). However, neither Annis (1981) nor Kiewra (1985) included PowerPoint during the lecture. Cornelius and Owen-DeSchryver (2008) utilized PowerPoint, but the effects on performance were not immediate, as they did not emerge until the last two tests of the semester.

Despite the fact that notes condition did not have the expected effect on locus of control, self-efficacy, or performance, some noteworthy relationships nevertheless

emerged. An interesting relationship was noted between self-efficacy and interest: Participants with higher self-efficacy also reported greater interest in the material during the lecture and the exam. Similarly, participants who were more interested in the material experienced a greater positive change in self-efficacy. Additionally, those with higher self-efficacy during the lecture scored better on the exam. Participants with higher self-efficacy experienced lower cognitive load during the exam, as did those who were more interested in the material. Consistent with previous findings on cognitive load, those who experienced higher cognitive load scored worse on the exam.

Previous research findings on academic-self-efficacy and scholastic performance were upheld in this study. Additionally, the results of the present study suggest that students are likely to experience an increase in self-efficacy if they are more interested in the course material. Finally, the results indicate that interest in course material plays a sizable role in cognitive load, which is negatively correlated with performance. These results could mean that classroom changes and policies meant to address one of these areas might also cause unintended effects on other areas.

The potential implications for these findings are important to both teachers and students. If teachers can encourage student interest in the material, students may benefit from improved academic self-efficacy. Additionally, encouraging student interest could have positive effects on cognitive load, which is likely to have a desirable impact on performance. Future studies could seek to examine the difference in cognitive load demands during lecture between those students provided with partial notes and those provided with complete notes. Results of such studies would provide further useful

information regarding the impact of teaching techniques on factors that affect performance.

Limitations

There were several limitations in this study. First, the low return rate for Part 2 of the study limited our ability to run additional analyses (e.g., mediation models and tests of interactions). Additionally, despite the attempt to motivate participants with additional StudyBoard credits, participants were nevertheless aware that there would be no long-term effects of poor performance on the exam. Low motivation might, therefore, have played a role in the relationships between variables in the present study, as well as in the low average exam score of participants. Future studies might seek to compare partial and complete presentation notes in actual college courses, in order to examine the effects on factors affecting performance using more realistic conditions. These studies might also be able to overcome another limitation of this study—the inability for participants to take their notes home to study. This part of the protocol prohibited participants from utilizing study habits they might typically favor, thus potentially affecting performance. Students and educators would benefit from a better understanding of the impact of partial and complete presentation notes on factors affecting performance.

Continued research is necessary into the wide variety of techniques and tools that are frequently utilized in the classroom. Existing research has clearly demonstrated that some technological advances do not benefit students as anticipated, such as the use of computers and word processors for note taking (Mueller & Oppenheimer, 2014). The results of the present study reveal relationships between individual differences that can impact performance, such as locus of control, self-efficacy, interest, cognitive load, and

instructor-controlled variables, such as whether partial or complete notes are provided. These factors, and their potential interactions, should be considered when deciding whether to provide partial, complete, or no notes to students.

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APPENDIX A: PALS Academic Efficacy Scale
(Midgley et al., 2000)

Here are some questions about you as a student in this class. Please circle the number that best describes what you think.

1. **I'm certain I can master the skills taught in class this year.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

2. **I'm certain I can figure out how to do the most difficult class work.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

3**. I can do almost all the work in class if I don't give up.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

4**. Even if the work is hard, I can learn it.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

5. **I can do even the hardest work in this class if I try.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

APPENDIX B: Fishman's Scales of Primary and Secondary Academic Control
(Fishman, 2014)

Please indicate your level of agreement with each statement below.

1. **I have a great deal of control over my academic performance in my courses.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

2. **The more effort I put into my courses, the better I do in them.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

3. **No matter what I do, I can't seem to do well in my courses.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

4. **I see myself as largely responsible for my performance throughout my college career.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

5. **How well I do in my courses is often the 'luck of the draw'.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

6. **There is little I can do about my performance in college.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

7. **When I do poorly in a course, it's usually because I haven't given my best effort.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

8. **My grades are basically determined by things beyond my control and there is little I can do to change that.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

9. **My academic performance and experience has given me a deeper understanding of my life than could be achieved without this experience.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

10. **Regardless of what my grades are, I try to appreciate how my college experience can make me a 'stronger person' overall.**

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

11. No matter how well I do on a test or in a course, I try to see beyond my grades to how my experience at college helps me to learn about myself.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

12. Whenever I have a bad experience at college, I try to see how I can 'turn it around' and benefit from it.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

APPENDIX C: Study Efficacy

Here are some questions about you as a student in this StudyBoard Study. Please circle the number that best describes what you think.

1. **I'm certain I can master the material covered in this study.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

2. **I'm certain I can figure out how to answer the most difficult questions in this study.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

3**. I can complete all of the tasks in this study if I don't give up.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

4**. Even if the material is hard, I can learn it.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

5. **I can answer even the hardest questions in this study if I try.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

6. **I feel confident about my capability to perform the study tasks well.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

7. **I will be able to answer difficult questions if I invest the necessary effort.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

8**. I feel confident that I will be able to effectively manage unexpected troubles.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

9**. I am totally confident that I can succeed at this task.**

1	2	3	4	5
Not at All True		Somewhat True		Very True

APPENDIX D: DEMOGRAPHIC QUESTIONNAIRE

1. Year in School (please circle one):

   Freshman Sophomore Junior Senior Other

2. How would you describe yourself? (Please circle one)

   Male Female Transgender

   Do not identify as female, male, or transgender

3. Age: _____

4. What is your major? _____

5. Have you taken at least one previous semester of classes at WKU? (please circle one)

   Yes No

6. Is English your native language? (please circle one)

   Yes No

   If no, what age did you learn to speak English? _____

7. Do you speak any languages other than English?

   Yes No

   If yes, please list all other languages you speak and your proficiency level below.

APPENDIX E: The Sanitary Movement Lecture Script

- Approach to public health
- Called the Sanitary Movement

Slide

- Started in Britain in the 1830s and 40s
- Moved to North America, France and Italy, where cities were rebuilt in accordance with sanitary principles
- First public health movement
- Had two main purposes

Slide

- First purpose: prevent infectious disease
- Second purpose: removal of filth
- Based on filth theory of disease
- So focus of sanitary movement was on the towns and cities that had sprung up with urbanization and the industrial revolution

Slide

- Epidemic diseases mostly claimed victims in the cities
- The lasting effects were especially pronounced in urban areas
- The sanitary movement is one of those lasting legacies

Slide

- The background of the sanitary movement began with challenges to health during the industrial revolution in Europe
- Many changes during this time
- Including the rise of commercial agriculture, driving peasants off the land
- Also major demographic growth supported by the new agriculture
- Fading threats of famine and plague

Slide

- The rise of manufacture
- The factory system, particularly the textile industry, that came with unregulated working conditions like long hours, low wages, and child labor
- In Europe, urban populations doubled in the first half of the 19th century
- This overwhelmed the infrastructure of available jobs, housing, sanitary arrangements
- Leading to the rise of tenement slums and sweatshops

Slide

- Urban and industrial centers, also in Britain, were thought of as dangerous, politically, because of the "dangerous classes" who rioted, sometimes committed crime, and threatened revolution
- These people were medically dangerous as well, often were infected with cholera and other diseases
- Cholera was a prod to action

Slide

- The sanitary movement was vast
- Retrofitting of urban centers, with specific goal of removing filth
- Filth was thought of as cause of disease
- One of the great public works projects of modern history
- Included the establishment of sewer system, infrastructure of water mains

Slide

- Waste removal, street cleansing, improved and less crowded housing, creation of parks and public spaces
- Victorian Britain was very preoccupied with the combination of waste and water

Slide

- Sir Edwin Chadwick was a leader of this movement
- He wrote "The Report on the Sanitary Condition of the Labouring Population of Great Britain in 1842"
- He was not a physician, but a lawyer
- He was already well-known for his reform of the welfare provisions in Britain

Slide

- After Chadwick's report, a Public Health Act of 1848 was created in Britain
- Also created a general Board of Health

Slide

- For Chadwick, the poor were responsible for their own problems
- They weren't innocent or harmless
- He wanted to cleanse and civilize the "dangerous classes"
- Because he wasn't a physician, his reforms were not based on any new medical discoveries, scientific experimentation or observation to create measures that were most effective
- His reform measures were based more on the commonsense and assumptions of the period

Slide

- Sanitation worldview led to effects all over the continent
- Many cities were entirely rebuilt
- This was different than what happened in Britain, it was more comprehensive and systematic. Involved more urban planning
- In Britain it was more retrofitting cities with sewers and drains and other sanitary provisions
- Other cities were completely leveled, or neighborhoods were leveled, and rebuilt according to a comprehensive plan

Slide

- Paris established the pattern of rebuilding
- Cholera ravaged Paris in the 1830s and again in 1849
- This was shocking, because people previously thought that civilization was protection against sudden and agonizing disease
- It seemed to be a contradiction that Paris, which prided itself at being the center of European intellectual life and a leader in arts and culture and scientific medicine, could still be devastated by a disease that was connected to poverty and filth

Slide

- Project of public works
- That meant employment opportunities
- Paris became a huge public works project
- The workers would be employed and pacified
- Thought this would have an economic role as well due to larger streets and spaces
- These larger spaces would allow for movement of goods and assist free trade and commerce
- Public health objective as well: to improve health and prevent return of infectious disease

Slide

- Average size width of street in Paris was doubled
- Sewers and drains created under the streets
- Water supply
- Creation of broad parks and public areas
- Intersection of broad streets would allow air and light to sweep through city and remove smells, purify, cleanse the city

Slide

- After these changes, Paris was much healthier as a city than before
- Cholera did not return to the city center

- However, it did return, in the 1890s to the suburbs
- Sanitary problem was not entirely solved then, just exported to the suburbs
- Suburbs experienced return of Cholera in 1892

Slide

- Italy's largest city, Naples, had a unique response to the sanitary movement
- Other cities planned projects based on preventing a variety of diseases
- In Naples, they decided to rebuild for the specific purpose of preventing the return of Cholera
- The plan they developed reflected the specific medical understanding of the time of the cause of cholera

Slide

- Rebuilding of Naples was for that single purpose
- Medical theory behind this rebuilding was of a physician from Bavaria, Max von Pettenkofer
- He had an enormous influence on public health
- Aim behind rebuilding Naples was to thin out population
- Overcrowding was a cause of disease
- Poisonous vapors arose from underneath the city poisoned the air, people breathed in poison and succumbed to cholera, according to Max von Pettenkofer

Slide

- Plan was to raise the level of the streets because danger was beneath the streets
- Wanted to place greater distance between population living above, and poisonous vapors below
- Goal was to raise streets to the second story of the houses
- Create a cushion between the population and the danger below

Slide

- This enormous project in Naples was related to those in Britain and Paris
- It was different because it's the only example of a project conducted exclusively for the purposes of defeating a single disease: Cholera

Slide

- Although Naples was rebuilt, there was a return of Cholera in 1911 and another in 1973.
- Sanitary movement in Britain, retrofitting of cities, rebuilding of cities like Paris, did achieve success
- But these plans weren't based on medical theory that lasted,

Slide

- No sooner was rebuilding complete in Naples than theories of Pettenkofer were overturned, in favor of the germ theory of disease
- Some of the lasting impacts are embodied in the bricks and mortar of urban planning
- These impacts are visible in the urban landscape itself

APPENDIX F: Complete Handouts

The Sanitary Movement

Beginnings

- Pioneered in Britain in 1830's and 1840's
- Exported to North America
- Rebuilding in some European cities
- First Public Health Movement

Beginnings Continued

- Goals: prevent disease and remove filth
- Relationship between filth and disease: Filth Theory
- Basis of the Sanitary Movement
  - Focused on cities

Diseases

- Most victims in cities
- Lasting effects most obvious in urban areas
- Sanitary Movement as lasting legacy

Background

- Industrial Revolution challenges health
- Rise in commercial agriculture
- Major demographic growth
- Fading threat of famine and plague

Challenges

- Rise of manufacture, factory system
- Urban populations doubled across Europe in first half of 19th century
  - overwhelming job market, housing stock, sanitary arrangements
  - Rise of tenement slums, sweatshops

Dangers

- Urban and Industrial Centers
- Dangerous Classes
  - Rioted
  - Committed Crime
  - Infected with Diseases
- Cholera

Accomplishments

- Retrofitting of urban centers
- Removing filth
- Establishing sewer systems
- Infrastructure of water mains

Accomplishments Continued

- Waste removal
- Street cleaning
- Improved housing
- Creation of parks and public spaces

Sir Edwin Chadwick

- Produced "The Report on the Sanitary Condition of the Labouring Population of Great Britatin of 1842"
- Well known lawyer
- Welfare reform advocate

Implications

- Public Health Act of 1848 in Britain
- General Board of Health

Chadwick's Ideology

- Poor as responsible for their plight
- Attempts to cleanse and civilize the "dangerous classes"
- Reforms not based on medical science, but assumptions

Offshoots

- Rebuilding cities
- Urban Planning
- Leveling cities or neighborhoods to rebuild according to plans

Paris

- Cholera epidemic 1830s and 1849
- Implications of leading city ravaged by disease of poverty and filth

Rebuilding Paris

- Employment
- New streets facilitate movement of goods, free trade, commerce
- Improve health

The Streets of Paris

- Street width doubled
- Sewers and drains under streets
- Parks and public spaces
- Changes allow air and light to pass through

Effects in Paris

- No Cholera in city center
- Sanitary problem not entirely solved
- Problems exported to suburbs
  - Cholera returns in 1892

Naples

- Unique response
- Rebuilding to prevent return of Cholera specifically
- Plans reflected current medical understanding

Max von Pettenkofer

- Physician
- Thin out population—overcrowding as cause of disease
- Poison from under city in air

The Plan in Naples

- Raise street level
  - Second story
- Danger beneath the streets
- Increase distance between population above and disease below, create cushion

Effects

- Above and below ground changes
- Distinct from other European rebuilding
- Better health

Aftermath

- Return of Cholera to Naples in 1911, 1973
- Sanitary Movement as successful
- Decisions based not on enduring medical science

Aftermath Continued

- Pettenkofer's theories overturned
- Germ theory emerges
- Urban planning impacts

APPENDIX G: Partial Handout

The Sanitary Movement

Beginnings

- Pioneered in _____ in 1830's and 1840's
- Exported to North America
- _____ in some European cities
- First Public Health Movement

Beginnings Continued

- Goals: _____and remove _____
- Relationship between filth and disease: _____ Theory
- Basis of the Sanitary Movement
  - Focused on cities

Diseases

- Most victims in _____
- Lasting effects most obvious in urban areas
- _____as lasting legacy

Background

- _____challenges health
- Rise in commercial agriculture
- Major demographic _____
- Fading threat of _____ and plague

Challenges

- Rise of _____, factory system
- Urban populations doubled across Europe in first half of 19th century
  - overwhelming job market, housing stock, sanitary arrangements
  - Rise of tenement slums, _____

Dangers

- Urban and Industrial Centers
- _____ Classes
  - Rioted
  - Committed Crime
  - Infected with Diseases
- Cholera

Accomplishments

- Retrofitting of _____
- Removing filth
- Establishing _____ systems
- Infrastructure of water mains

Accomplishments Continued

- Waste removal
- Street cleaning
- Improved _____
- Creation of _____ and public spaces

Sir Edwin Chadwick

- Produced "The Report on the Sanitary Condition of the Labouring Population of Great Britatin of 1842"
- Well known lawyer
- Welfare _____ advocate

Implications

- Public Health Act of 1848 in Britain
- General Board of Health

Chadwick's Ideology

- Poor as _____ for their plight
- Attempts to cleanse and civilize the "dangerous classes"
- Reforms not based on medical science, but _____

Offshoots

- Rebuilding cities
- Urban _____
- Leveling cities or neighborhoods to rebuild according to plans

Paris

- Cholera epidemic 1830s and 1849
- Implications of _____ city ravaged by disease of poverty and filth

Rebuilding Paris

- Employment
- New streets facilitate movement of goods, _____, commerce
- Improve health

The Streets of Paris

- Street width doubled
- Sewers and _____ under streets
- Parks and public spaces
- Changes allow _____to pass through

Effects in Paris

- No Cholera in _____ center
- Sanitary problem not entirely solved
- Problems _____ to suburbs
  - Cholera returns in 1892

Naples

- Unique response
- Rebuilding to prevent return of _____ specifically
- Plans reflected current _____ understanding

Max von Pettenkofer

- Physician
- Thin out population—_____ as cause of disease
- Poison from under city in air

The Plan in Naples

- Raise _____ level
  - Second story
- Danger beneath the streets
- Increase distance between population above and _____ below, create cushion

Effects

- Above and below ground changes
- _____ from other European rebuilding
- Better _____

Aftermath

- Return of Cholera to Naples in 1911, 1973
- Sanitary Movement as _____
- Decisions based not on enduring medical science

Aftermath Continued

- Pettenkofer's theories overturned
- _____ theory emerges
- Urban planning impacts

APPENDIX H: Interest Measure

Here are some questions about your as a student in this StudyBoard study. Please circle the number that best describes what you think.

I am interested in this **study** because…

1. I feel enthused about being in this study.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

2. The study makes me feel excited.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

3. The study causes me to feel energized.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

4. The topics covered in the study fascinate me.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

5. Being in the study is enjoyable.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

6. The study experience makes me feel good.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

7. The material fascinates me.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

8. I like the things we covered in this study.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

9. The study experience feels very positive.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

10. I can remember the study material.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

11. I feel like I am learning topics covered in the study.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

12. I can understand the flow of ideas.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

13. I understand the study material.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

14. The information covered in the study is making me more knowledgeable.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

15. The information in the study is useful.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

16. I realize what is expected of me.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

APPENDIX I:
The Sanitary Movement Exam

1. Where did the Sanitary Movement begin?

2. The Sanitary Movement was based on a theory of disease. The name of that theory of disease is:

3. Name two challenges to health that contributed to the Sanitary Movement.

4. Why might citizens have preferred to live outside of urban centers?

5. Name three public works projects during the Sanitary Movement.

6. How might the poorer classes have felt about Chadwick's proposals?

7. How might a citizen of Paris have felt about the cholera outbreak of 1849?

8. Why was the sanitary problem in Paris not considered completely solved?

9. What was the main public works project in Naples?

10. Why were the public works projects in Naples different from those in Paris?

11. What might have happened if the public works projects of the Sanitary Movement had not been carried out?

12. Why did Naples experience another outbreak of Cholera following the Sanitary Movement?

13. What did Max von Pettenkofer suggest was the cause of disease?

14. Which theory of disease dominated following the Sanitary Movement?

APPENDIX J: Cognitive Load Measure

The activity I just completed was:

1	2	3	4	5	6	7
Not difficult			Somewhat difficult			Very difficult

APPENDIX K: Conclusion Questionnaire

Please circle the appropriate number to indicate your level of agreement.

I was motivated to try harder on the exam because I knew that a better score meant I would get more StudyBoard credits.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

Have you ever taken a class that covered the material presented in this study? (Please circle one)

Yes No

If yes, please provide an approximate date (e.g., Spring 2012) _____